

Letter for Electronic Distribution
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January 16, 2001

Ms. Runore C. Wycoff, Director
Environmental Restoration Division
U.S. Department of Energy
Nevada Operations Office
P.O. Box 98518
Las Vegas, Nevada 89193-8518

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

RE: Approval of Corrective Action Investigation Plan, Revision 0
Corrective Action Units 97: Yucca Flat/Climax Mine
Federal Facility Agreement and Consent Order

Dear Ms. Wycoff:

The final Corrective Action Investigation Plan (Revision 0) for Corrective Action Unit (CAU) 97, Yucca Flat/Climax Mine, Nevada Test Site, has been reviewed by Nevada Division of Environmental Protection staff, Bureau of Federal Facilities (NDEP). NDEP has identified concerns which include the previous concerns that have not been adequately addressed, and therefore, the Corrective Action Investigation Plan is hereby approved with comments, which are given below pursuant to Subpart XII.8.a of the Federal Facility Agreement and Consent Order (FFACO).

Previous NDEP Reviews and Comments

The Corrective Action Investigation Plan for Corrective Action Units 97:, Yucca Flat/Climax Mine Nevada Test Site, Nevada, Revision No. 1, September 2000 (document) (CAIP-YFR0), was received by the Nevada Division of Environmental Protection (NDEP) on October 6, 2000. Prior to receiving this document, NDEP had received, reviewed, and provided comments on the following preliminary draft version:

Corrective Action Investigation Plan

For Corrective Action Unit 97:

Yucca Flat/Climax Mine, Preliminary Draft, Revision No.0, March 2000

The comments on the above preliminary draft version were submitted in a NDEP letter (Liebendorfer to Wycoff) dated June 30, 2000.

In addition to these comments, NDEP provided further comments on the data requirements for the CAU 97, Yucca Flat/Climax Mine Corrective Action Unit in a letter dated September 5, 2000. The comments in this September 5 letter were largely not addressed in the CAIP-YFR0, because of the timing of the release of the letter and the release of the CAIP-YFR0. NDEP has incorporated the remaining comments from the preliminary draft with those comments on the data requirements into this approval with comments letter.

UGTA Technical Strategy

The proposed changes to Underground Test Area (UGTA) Technical Strategy were agreed to and accepted on Dec. 28, 2000. The current strategy provides the necessary detail to clarify the UGTA process for conducting corrective actions investigations and subsequent work. The conduct of the investigations and subsequent documents will have to address and be developed in accordance with this current strategy.

COMMENTS

Introduction to Comments

The UGTA Corrective Action Investigation (CAI) is an iterative process that should logically be developed in phases. The CAI is a process of increasing data collection and information analysis until the conceptual model is considered adequate for the development of a defensible flow and transport model from which a Corrective Action Decision can be made. The Corrective Action Investigation is performed to collect and examine the physical, chemical, and environmental factors that affect the distribution and transport of the contaminants of concern. These factors must be fully understood in order to evaluate remedial alternatives and cleanup technologies. The process begins with the development of an initial conceptual hydrogeologic model of the site and the surrounding environs. The conceptual hydrogeologic

model is then further refined through phased data collection , analysis, modeling, and evaluation.

This approval with comments letter sets into motion what NDEP considers to be the first phase of the CAI as layed out in the current UGTA Technical Strategy. This will allow DOE to move forward recognizing that NDEP's position is that additional data acquisition over and above what has been presented in this CAIP is perceived as being necessary. NDEP concurs that the work proposed in this CAIP needs to be conducted and when completed it will be evaluated for its ability to acceptably address the following comments. However, NDEP's position is that more extensive work will be required before an acceptable Flow and Transport Model is developed and a Corrective Action Decision can be determined.

Comment No. 1: Conceptual Model

In the June 9, 2000 letter and the September 5, 2000 letter (referenced above), NDEP indicated that the conceptual model (CMO) as presented lacked clarity. NDEP recognizes that DOE has included additional information from the geologic model in this latest version of the CAIP in order to bolster the CMO. Sources of information used to develop the CMO were cross-referenced with earlier reports, however, much of this information is disseminated throughout the CAIP, therefore it is difficult for the reader to assemble pertinent information into a functional conceptual model while progressing through the document. For example, NDEP still cannot determine from the CMO the current understanding of the size and nature of groundwater contamination across this CAU resulting from weapons testing.

It is paramount that the CMO is clear, and paints a coherent picture of the current thinking as to the hydrologic setting controlling groundwater flow into, through, and out of the contaminated sites, and the predominant contaminant release and transport mechanisms at work. It should pull together the best and most recently available information. The CMO is an integral part of the DQO process and forms the underlying basis or template for the investigation and modeling effort. NDEP will review future submittals to assess how closely the CMO reflects the definition of the term that NDEP conveyed to DOE in the December 28, 2000 letter. The definition in the December 28, 2000 letter was as follows:

“Conceptual Model - an interpretation or working description of the characteristics and dynamics of the physical system. (ASTM) For the UGTA investigations, the conceptual model is a simplified representation of the important factors affecting the availability,

release and discharge, and migration of contaminants. Central to the conceptual model, in terms of constructing a computer model, is a clear illustration of the fundamental elements of the groundwater flow system. Conceptual models are typically depicted using both pictorial representations (maps, 3-D block diagrams, cross-sections, etc.) and accompanying descriptive text.”

Comment No. 2: Adequacy of Data.

DOE is proposing to collect additional data. NDEP concurs that this data collection is needed. However, NDEP’s position is that even with these additional data and analyses, this work is still not adequate and sufficient to develop an understanding of the site for the development of the CAU Flow and Transport Model. This lack of adequate data is apparent in numerous areas of the study. For example, several geographic areas within the Yucca Flat CAU represent zones of localized hydrogeologic interest. The importance of these areas stems from the fact that they represent anomalous hydraulic conditions, with respect to the accepted view of Yucca Flat hydrogeology. Additionally, these areas of interest may be related to potential “failure mechanisms”; i.e. hydrogeologic scenarios which permit contaminants to move away from the testing areas and out of the Yucca Flat basin at an accelerated rate. NDEP maintains that at a minimum a thorough understanding of the following characteristics of the flow system, which can only be garnered through adequate field data, is necessary for a thorough CAI, a defensible Flow and Transport Model, and Corrective Action Decision:

1) Specific Hydrologic Head Data - The primary controlling factor for the migration of contaminants is the rate and direction of groundwater flow. Based on the information presented, insufficient potentiometric head data exist to determine the actual three-dimensional groundwater flow directions, presence or absence of vertical flow, and flow rates. Additional wells/piezometers may need to be installed to obtain the data to determine the actual flow paths. These data can then be used to support DOE’s understanding of the flow system prior to development of the CAU-specific flow and transport model;

2) Hydrogeologic Setting of Climax Mine - The hydrogeological relationship between the Climax Mine area and the Yucca Flat area has not been adequately characterized. Major structures are known to separate the two areas, and the understanding of the hydrogeologic interconnection is incomplete. DOE needs to address this issue which may require proposing additional studies to minimize this uncertainty before modeling can be initiated;

3) Lower Carbonate Aquifer and the Identified High Pressure Zone - Insufficient information exists concerning the hydraulic connection between the Lower Carbonate Aquifer (LCA) and transmissive units in the upper impacted portion of the geologic section in the Yucca Flat area. Although some hydrologic parameter data exist for the LCA in the Yucca Flat area, coverage is sparse and is not documented as being representative of conditions in the central portion of the valley where recharge to the LCA is thought to occur from overlying aquifers. It is also unclear if the areal extent of the LCA in Yucca Flat is well known. A High Pressure Zone, identified within the LCA in earlier work, has not been adequately addressed in the CAIP. Though some local modeling work is proposed to study this phenomenon, additional field data may be required to define the extent and any potential affects of this pressure zone on the flow system;

4) Contaminant Transport Parameters - DOE's modeling efforts rely too heavily on previously-published parameter values for similar aquifer types and not enough on CAU-specific data. Literature values for these parameters, and numbers derived from laboratory batch experiments, may produce acceptable results, however use of these parameter values must be justified and verified *through in-situ measurements* as being representative of actual CAU conditions. NDEP's position is that parameters effecting contaminant transport, such as dispersivity, diffusivity, and porosity, require further CAU-specific investigation.

Comment No. 3: Near Field Data

NDEP considers an important issue, in terms of developing an acceptable level of understanding of the actual size and extent of contamination, are the conditions in the near field. The near field is considered to be the area that is roughly within 10 cavity radii of each event. There are currently some data available for the near field that were developed by the Hydrologic Resource Management Program (HRMP). It is questionable if these data can be effectively utilized given the size and complexity of Yucca Flat. This is especially evident considering the number of tests, the varying depth of the events, and the CAU geologic and hydrologic conditions.

DOE has proposed some additional near field work in this document and NDEP is aware of the ongoing source term work being performed by outside research organizations. NDEP considers the radionuclide fate and transport work being undertaken as part of the UGTA investigations to be unique with respect to similar studies being conducted at other facilities in the DOE complex. That is, these studies should be sensitive to the fact that the suite of

radionuclides produced in nuclear detonations is different than those found at sites where special nuclear materials were merely produced and processed.

NDEP recognizes that in order to fully address conditions in the near field domain, there will be a need to use classified data and perform classified evaluations. Appropriately cleared NDEP personnel will review this classified information in accordance with the approved security procedures for handling of classified materials. The contaminant boundaries of the unclassified investigations must be sufficiently broad to encompass all classified issues.

Comment No. 4: Hydrologic Parameters

The flow model being proposed for Yucca Flat must utilize a complete and reliable set of hydrologic parameter data in order to be accepted. While Yucca Flat has the largest data set of all the UGTA CAUs, it remains NDEP's position that the existing geologic and hydrologic data are too sparse. The ranges of parameter values in the existing data have not been documented to be representative of the true variability found across the area of investigation. Additional data points for the hydraulic parameters used in the model, or those which simply provide a basis of understanding of the flow system, need to be measured or derived for the principal aquifers within the CAU.

Comment No. 5: Regional Controls on Groundwater Flow and Water Budget

Even though the Yucca Flat/Climax Mine has the most drill holes of any of the CAUs, it is NDEP's position that the major geologic structural controls which influence groundwater movement into, under, through, and out of the Yucca Flat and Climax Mine area are still not adequately understood. This is particularly important for this CAU because of the size of Yucca Flat and the complex array of hydrogeologic features present. Controls of interest would include features such as faults, shear zones, and fracture zones, not only in the Yucca Flat/Climax CAI immediate area, but also those in the external Death Valley Groundwater Basin, which influence the groundwater movement into and out of the CAU.

The conceptual basis of groundwater flow through the region that is presented in the CAIP is strongly founded on the hydrogeologic constructs developed as part of the regional modeling effort. However, the understanding of the regional flow system may not be as complete as this heavy reliance would suggest. Two studies proposed in this CAIP, *Geophysical Interpretation of the Paleozoic Framework - Section 6.1.2* and *Analysis of Existing Seismic*

Data - Section 6.1.3, will provide additional information on the hydro stratigraphy of the Yucca Flat basin. New interpretations derived from this work may alter the regional hydro stratigraphic model and call into question the representativeness of the existing regional groundwater flow model. This proposed work, as well as recent work performed by others studying the Death Valley region intended to enhance the understanding of the regional flow system and refine conceptual and numerical models of the area, should be carefully considered and incorporated where appropriate at both the CAU and regional modeling scale.

Another aspect of the hydrogeology needing further investigation involves the water budget for the CAU-model area. Additional studies which attempt to estimate the water entering and leaving the Yucca Flat system through recharge, baseflow, and evapotranspiration may be needed. A water budget is a useful tool for evaluating how well the system is understood. It provides a measure of confidence that model boundary conditions were correctly chosen and that those parameters distributed across wide areas (principally fluxes and recharge) fall within reasonable ranges.

A water budget could be developed for subareas within the CAU. These subareas could be used to tie together hydrologically diverse portions of the CAU into a more acceptable, wider-area model(s) as discussed in comment No. 8. It is necessary that some approximation of the water budget for the areas of investigation be calculated prior to attempting detailed numerical modeling. NDEP views an understanding of regional controls and water budget as fundamental elements of the UGTA investigations.

Comment No. 6: Hydrogeochemical Data

Studies of the aqueous geochemistry, which are used to interpret the hydrogeology of the large and complex Yucca Flat/Climax Mine area, are poorly discussed and presented in the CAIP. Additional knowledge is needed in terms of the major ion chemistry, trace elements, and isotopic ratios in the groundwater flow system. In Section 6.1.5 of the CAIP-YFR0, isotope and geochemistry mass balance studies including collection and analysis of additional field data are proposed. However, it is NDEP's position that additional collection and analysis of field data of this nature must be considered in order to further characterize the hydrologic system.

Comment No. 7: Important Event Characteristics

As investigations of the CAUs have progressed, it has become apparent that what might be termed “important event characteristics” can have a significant effect on radionuclide availability and transport. The CAI must not overlook the potential impact these aspects of weapons testing may have. It is NDEP’s position that future submittals must include, but not necessarily be limited to, some discussion regarding data available for the following topics:

- a) shafts, tunnels, and various conduits which may enhance near-field radionuclide movement;
- b) special or unusual radionuclides or other materials introduced into the near-field environment;
- c) unusual features of the weapon design or test circumstances that could effect contaminant availability and transport;
- d) other pertinent characteristics related to this issue.

As with the near field data discussed in Comments 3, NDEP recognizes that in order to fully address important event characteristics, there may be a need to use classified data and perform classified evaluations. Appropriately cleared NDEP personnel will review this classified information in accordance with the approved security procedures for handling of classified materials. The contaminant boundaries of the unclassified investigations must be sufficiently broad to encompass all classified issues.

Comment No. 8: Size and Complexity of the Area

The Yucca Flat/Climax Mine CAU covers a wide area with multiple complex hydrogeologic conditions. In fact, the hydrogeologic parameters within the same hydrologic units may be significantly diverse across the large area of the Yucca Flat/Climax Mine CAU. NDEP suggests that DOE further segment the yucca Flat/Climax Mine CAU into several sub-areas. Breaking the CAU into sub-areas based on hydrogeologic criteria would allow a more focused examination of near-field parameters affecting flow and transport.

In accordance with the local-scale modeling being proposed in Section 5.2.4, a smaller-scale sub-area approach taken initially, could be followed by a larger-scale approach, should similarities in parameters be found in certain sub-areas. This approach could identify those

areas requiring more intensive investigation while allowing other, broader regions to be lumped together and treated similarly.

Comment Conclusions

DOE's response to the concerns expressed in all of the above comments will be evaluated as part of the *NDEP Data Review/Input* task in the current UGTA Technical Strategy. Failure to sufficiently address these comments will result in a determination that the data are not adequate to progress to development of the CAU Flow and Transport Model.

In summary, the CAIP-YFR0 has been approved with comments. At a minimum, DOE must address the above comments in subsequent documents. Future submittals will also have to reflect changes that are now required in the current UGTA Technical Strategy. This includes a demonstration that DOE's level of understanding is sufficient and adequate data exist to proceed to the *Develop CAU Flow & Transport Model* task. NDEP views this CAIP as the first step in an iterative investigation process. Each step forward will improve the level of understanding concerning the CAU and allow a better assessment of the remaining work required before a sound Corrective Action Decision can be made.

Schedules and Time Frames

The DOE must propose schedules and time lines for interim work products completed as part of the Yucca Flat/Climax Mine CAU. Interim work products are preliminary reports, data evaluation summaries, significant accomplishments or developments in the model construction process, supplemental materials, and presentations which cover any of these items. The submission of more-detailed project schedules follows a similar submission made for CAUs 101 and 102 in a May 2000 letter. This information permits NDEP to engage in an evaluation of CAI status as part of our responsibilities under the *NDEP Data Review/Input* task in the current strategy.

Therefore, within 90 days of receiving this letter, which is hereby established as a DEADLINE, DOE shall provide a schedule with proposed time frames for each of the interim work products for Yucca Flat/Climax Mine Corrective Action Investigation work. This must include the proposed dates for completion of the data collection and evaluation activities outlined in this CAIP, as well as start and completion dates for modeling activities. NDEP will evaluate the interim schedules and the revised baseline

schedule for the CAU to determine what might be an appropriate DEADLINE for the CADD. Upon receipt of the above schedule NDEP may also, in accordance with Part XII.4 of the FFACO, establish DEADLINES for interim activities which lie within the FY+2 time period.

The Corrective Action Investigation Plan was previously not found to be Substantially Deficient pursuant to Subpart VIII.3.b of the FFACO and the Notice of Completion was issued in the Time Frame for Review letter dated October 31, 2000 (Liebendorfer to Wycoff). NDEP will evaluate the adequacy of DOE's proposed resolution to these comments in accordance with the process in the current UGTA Technical Strategy. As a general note, proposed extensions for future DEADLINES must be applied for in accordance with Subpart X of the FFACO. NDEP's Time frame for review letter provided for an extension of the subsequent document Deadline. However, since there are currently no DEADLINES for documents beyond the CAIP in the FFACO, an extension is not applicable.

NDEP recognizes that as characterization/field work proceed, a change in the scope of the investigation may be required or justified based on information developed in the course of the ongoing work. Changes to the scope of work that was approved in the Corrective Action Investigation Plan (CAIP) should be proposed to NDEP as soon as possible.

It is recognized that the proposed alternative in the subsequent Corrective Action Decision Document (CADD) for this CAU will not clean closure, and following a review and preliminary determination of the appropriateness of the proposed action by NDEP, it will be necessary to present the proposed alternative to the Community Advisory Board by way of satisfying the requirement for public notice of a proposed action prior to formal approval of the document and recommended action by NDEP. For CAUs not located on the Nevada Test Site (NTS) and when the recommended alternative is not clean closure, the CADD must identify land/site use restrictions (LURs) that will be required. Furthermore, the CADD must state that the agency who is ultimately responsible for managing the land on which the CAU is located (Department of Energy for CAU 97) has accepted the proposed action including the need for LURs. Certification that the LURs have been entered in the appropriate tracking system must be provided in the subsequent Closure Report.

Questions regarding this matter may be addressed to Eric Noack at (775) 687-4670 Ext. 3032 or Paul Liebendorfer at (775) 687-4670 Ext. 3039.

Sincerely,

Paul J. Liebendorfer, P.E.
Chief
Bureau of Federal Facilities

PJL/KKB/MAD/MDM/REN/SJ/CJG/js

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